

20000822 171

EEDP-08-1  
November 1988



# Environmental Effects of Dredging Technical Notes



## THE VALUE OF WING DAMS FOR FRESHWATER MUSSELS

**PURPOSE:** This note provides information on the value of wing dams, which reduce dredging requirements in large rivers, for freshwater mussels.

**BACKGROUND:** Wing dams are longitudinal rock-rubble structures placed in waterways to develop and stabilize channels. Wing dams constrict low flows, which decreases maintenance dredging requirements (Shields 1983). These structures are usually oriented obliquely or at 90 deg to the current. Sediment deposition usually occurs between wing dams where current velocity is reduced relative to that in the unprotected main channel. Wing dams create quiescent areas that are similar to naturally occurring lentic habitats during normal and low flow (Beckett et al. 1983). In addition, wing dams themselves are a coarse-grained substrate used by aquatic insects and fishes (Conner, Pennington, and Bosley 1983; Pennington, Baker, and Bond 1983; and Shields 1983).

At Winter's Landing in pool 7 of the upper Mississippi River, wing dams were placed to direct flow toward the Wisconsin shoreline to reduce the need for maintenance dredging. The US Army Engineer District, St. Paul is considering modifying these wing dams to further reduce dredging requirements. Because of these plans, the value of these wing dams had to be assessed for mussels, and a determination had to be made concerning whether the federally listed endangered mussel *Lampsilis higginsii* inhabited the area.

**ADDITIONAL INFORMATION:** Contact the author, Dr. Andrew C. Miller, (601) 634-2141; Mr. Robert Whiting, US Army Engineer District, St. Paul, (612) 725-5934; or the manager of the Environmental Effects of Dredging Programs, Dr. Robert M. Engler, (601) 634-3624.

### Background

#### Study area

The study area is between river mile (RM) 707.8 and 709.4 in pool 7 of the upper Mississippi River, about 2 km north of Dakota, MN (Figure 1). Pool 7 extends from Lock and Dam 7 (RM 702.5) at Dresbach, MN, to Lock and Dam 6 (RM 714.3), near Trempealeau, WI. Sample sites (Figure 1) were located

US Army Engineer Waterways Experiment Station, Environmental Laboratory  
PO Box 631, Vicksburg, Mississippi 39181-0631

**DISTRIBUTION STATEMENT A**

Approved for Public Release

Distribution Unlimited

DTIC QUALITY INSPECTED 4

AQM00-11-3455

on wing dams (sites 1, 2); between wing dams within 200 m of the Wisconsin shore or protected by wing dams (3-18); farther offshore and unprotected by wing dams (19-27); and 50 to 600 m from the Wisconsin shore and unprotected by wing dams (28-32).

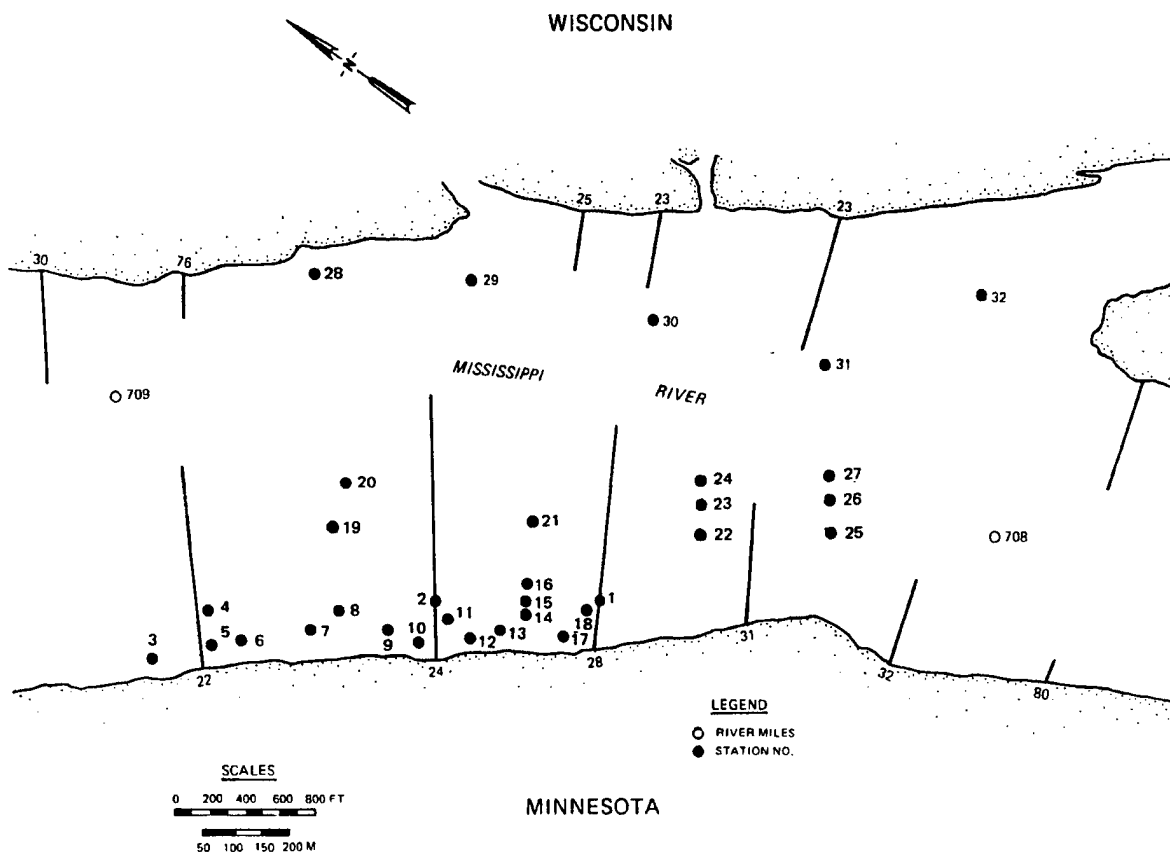


Figure 1. Sample sites located on wing dams

### Methods

Mussels were collected on May 19-21, 1987, by a four-man diving crew equipped with surface air supply. At each of 30 sites, a single diver spent 20 min collecting live mussels. Two sites on wing dams were searched for 40 min because of difficulty in maneuvering. Collecting was done by feel since visibility in the water was poor. This work was conducted under the authority of Endangered Species Permit No. PRT2-697830 of the US Army Engineer District, St. Paul.

### Major Findings

A total of 2,087 live mussels, representing 23 species, was collected during the survey (Miller 1988). Each of the 32 sites supported from 3 to 141 mussels representing 2 to 15 species. In addition to common mussels, three rare species (*Actinonaias ligamentina*, *Plethobasus cyphus*, and *Strophitus undulatus*), were collected. These had not been reported since 1930 (van der Schalie and van der Schalie 1950). Two specimens of the endangered *Lampsilis higginsii*, last collected in 1966 (Finke 1966), were also found. These uncommon mussels were collected within 200 m of the Minnesota shoreline at sites protected by wing dams.

The average total number of mussels collected per minute and the total species richness for sites were, respectively, 2.38 and 11 on wing dams and 4.47 and 23 in areas protected by wing dams and within 200 m of the Minnesota shore. Low values were found for sites unprotected and offshore (1.95 and 10) and for sites unprotected and 50 to 600 m from the Wisconsin shore (1.16 and 7). These data illustrate that the wing dams enabled development of a dense and rich mussel assemblage. Wing dams may also encourage mussels because they attract fishes that are necessary hosts for most species (Fuller 1974).

The US Army Engineer District, St. Paul proposes to shorten the wing dams on the Minnesota side and to lengthen those on the Wisconsin shore. In addition, five new wing dams will be constructed, and the Minnesota shore will be stabilized with riprap. This will direct the river toward the Minnesota side, its natural tendency, and reduce requirements for maintenance dredging (US Army Engineer District, St. Paul 1987). In addition, District personnel are considering placing dredged material (clean sands and silts) between two of the wing dams. This will quickly stabilize the substrate and provide colonization sites for mussels. In addition, this will be a beneficial use of dredged material, which otherwise might be wasted.

## References

- Beckett, D. C., Bingham, C. R., Sanders, L. G., Mathis, D. B., and McLemore, E. M. 1983. "Benthic Macroinvertebrates of Selected Aquatic Habitats of the Lower Mississippi River," Technical Report E-83-10, US Army Engineer Waterways Experiment Station, Vicksburg, MS.
- Conner, J. V., Pennington, C. H., and Bosley, T. R. 1983. "Larval Fish on Selected Aquatic Habitats on the Lower Mississippi River," Technical Report E-83-4, US Army Engineer Waterways Experiment Station, Vicksburg, MS.
- Finke, A. 1966. "Report of a Mussel Survey in Pools 4A (Lake Pepin), 5, 6, 7 and 9 of the Mississippi River during 1965," Wisconsin Department of Natural Resources, Madison, WI.
- Fuller, S. L. H. 1974. "Clams and Mussels (Mollusca: Bivalvia)," in: *Pollution Ecology of Fresh-Water Invertebrates*, C. Hart and S. L. H. Fuller, eds., Academic Press, New York, pp 215-273.
- Miller, A. C. 1988. "Mussel Fauna Associated with Wing Dams in Pool 7 of the Mississippi River," *Journal of Freshwater Ecology*, Vol 4, pp 299-302.
- Pennington, C. H., Baker, J. A., and Bond, C. L. 1983. "Fish of Selected Habitats on the Lower Mississippi River," Technical Report E-83-2, US Army Engineer Waterways Experiment Station, Vicksburg, MS.
- Shields, F. D. 1983. "Environmental Guidelines for Dike Fields," in: *River Meandering*, C. M. Elliott, ed., American Society of Civil Engineers, New York, pp 430-441.
- US Army Engineer District, St. Paul. 1987. "Design Analysis Report: Proposed Wing Dam Modifications, Winter's Landing, Pool 7, Upper Mississippi River."
- van der Schalie, H., and van der Schalie, A. 1950. "The Mussels of the Mississippi River," *The American Midland Naturalist*, Vol 44, pp 448-466.

## INTERNET DOCUMENT INFORMATION FORM

**A . Report Title: THE VALUE OF WING DAMS FOR FRESHWATER MUSSELS**

**B. DATE Report Downloaded From the Internet: 08/15/00**

**C. Report's Point of Contact: (Name, Organization, Address, Office Symbol, & Ph #):**  
US Army Engineer Waterways Experiment Station  
Environmental Laboratory  
PO Box 631  
Vicksburg, Mississippi 39181-0631

**D. Currently Applicable Classification Level: Unclassified**

**E. Distribution Statement A: Approved for Public Release**

**F. The foregoing information was compiled and provided by:**  
DTIC-OCA, Initials: \_\_LF\_\_ Preparation Date 08/21/00

The foregoing information should exactly correspond to the Title, Report Number, and the Date on the accompanying report document. If there are mismatches, or other questions, contact the above OCA Representative for resolution.